

CLAIMS

1. An internal combustion engine variable compression ratio system comprising:

5 a piston inner (5a) connected to a connecting rod (7) via a piston pin (6);

a piston outer (5b, 105b) that, while being fitted around the outer periphery of the piston inner (5a) so that it can slide only in the axial direction and having an outer end face thereof facing a combustion chamber (4a), is
10 capable of moving between a low compression ratio position (L) close to the piston inner (5a) and a high compression ratio position (H) close to the combustion chamber (4a);

a raising member (14, 114) that is disposed between the piston inner and the piston outer (5a, 5b), pivots around axes of the piston inner and the
15 piston outer (5a, 5b) between a non-raised position (A) at which movement of the piston outer (5b, 105b) to the low compression ratio position (L) is allowed and a raised position (B) at which the piston outer (5b, 105b) is held at the high compression ratio position (H), and allows, at the non-raised position (A), movement of the piston outer (5b, 105b) between the low compression ratio
20 position (L) and the high compression ratio position (H) by virtue of a spontaneous external force;

an actuator (20) connected to the raising member (14, 114);

piston outer stopper means (18) that is provided between the piston inner (5a) and the piston outer (5b, 105b), prevents movement of the piston
25 outer (5b, 105b) beyond the high compression ratio position (H), and allows movement of the piston outer (5b, 105b) toward the low compression ratio position (L); and

piston outer low compression ratio position latching means (30a) that is disposed between the piston inner (5a) and the piston outer (5b, 105b) and operates, when the piston outer (5b, 105b) has reached the low compression ratio position (L), so as to prevent relative axial movement of the piston inner (5a) and the piston outer (5b, 105b);

the system further comprising piston outer high compression ratio position latching means (30b) that is disposed between the piston inner (5a) and the piston outer (5b, 105b) and operates, when the piston outer (5b, 105b) has reached the high compression ratio position (H), so as to prevent relative axial movement of the piston inner (5a) and the piston outer (5b, 105b).

2. The internal combustion engine variable compression ratio system according to Claim 1, wherein

the piston outer high compression ratio position latching means (30b) comprises a peripheral first latching channel (31a) formed on an inner peripheral face of the piston outer (5b, 105b), a first latching member (32a) that is supported by the piston inner (5a) and moves between an operating position where it can engage with the first latching channel (31a) when the piston outer (5b, 105b) has reached the high compression ratio position (H) and a retracted position where it disengages from the first latching channel (31a), and driving means (39) for driving the first latching member (32a) to these two positions, and the piston outer low compression ratio position latching means (30a) comprises a peripheral second latching channel (31b) formed on an inner peripheral face of the piston outer (5b, 105b), a second latching member (32b) that is supported by the piston inner (5a) and moves between an operating position where it can engage with the second latching channel (31b) when the piston outer (5b, 105b) has reached the low compression ratio position (L) and a retracted position where it disengages

from the second latching channel (31b), and driving means (39) for driving the second latching member (32b) to these two positions.

3. The internal combustion engine variable compression ratio system according to Claim 2, wherein

5 the first and second latching members comprise a first arm (32a) and a second arm (32b) respectively that extend in opposite directions from each other from the center of swing of a single latching lever (32) swingably and axially supported by the piston inner (5a), and the latching lever (32) is swung by single driving means (39) so as to make the first and second arms (32a,
10 32b) engage alternately with the first and second latching channels (31a, 31b).

4. The internal combustion engine variable compression ratio system according to Claim 3, wherein

 the driving means (39) comprises an operating spring (34) that urges one of the first and second arms (32a, 32b) in a direction in which it engages
15 with the corresponding latching channel (31a, 31b), and a hydraulic piston (38) that is capable of receiving a hydraulic pressure from a hydraulic pressure source (46) and pushing the other of the first and second arms (32a, 32b) in a direction in which it engages with the corresponding latching channel (31a, 31b).